Small Business Innovation Research/Small Business Tech Transfer

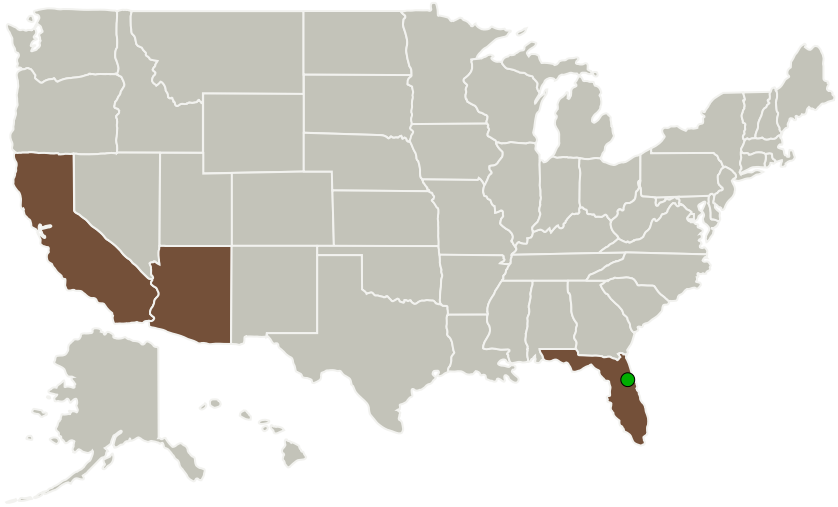
3D Geolocation of Current Pulses in Clouds Using a 6-Axis EB Vector Sensor, Phase I

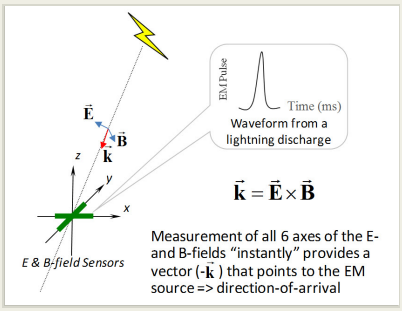
Completed Technology Project (2014 - 2014)

Project Introduction

Lightning discharges within or near critical facilities can disrupt activities or result in damage. Although existing lightning locating systems can geolocate breakdown processes with accuracies of 10s of meters at heights above 1.5-2 km, they do not accurately report ground strike locations or provide estimates of current and charge transfer. In addition, conventional VLF/LF LLS networks do not currently report lightning channels descending towards or contacting ground with enough accuracy to address this problem. There is a need for a system that can improve location accuracy and detection efficiency. Under this NASA STTR program, QUASAR Federal Systems proposes to team with Professor Ken Cummins of the University of Arizona to develop a lightning detection sensor based on an SoA 6-axis EB vector sensor and unique location and characterization algorithm. In Phase I, we will perform a feasibility study of using a 6-axis EB sensor to address NASA "total lightning detection" needs in location accuracy and detection efficiency. This will include both analysis and limited field measurements. We will also identify a system architecture and key components for the Phase II prototype. In Phase II of the project, we will develop a scientific prototype to demonstrate the technology with field data.

Primary U.S. Work Locations and Key Partners





3D Geolocation of current pulses in clouds using a 6-axis EB vector sensor Project Image

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Organizations Performing Work	Role	Type	Location
QUASAR Federal Systems, Inc.	Lead Organization	Industry	San Diego, California
Kennedy Space Center(KSC)	Supporting Organization	NASA Center	Kennedy Space Center, Florida
University of Arizona	Supporting Organization	Academia	Tucson, Arizona

Primary U.S. Work Locations	
Arizona	California
Florida	

Project Transitions

June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137674)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

QUASAR Federal Systems, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

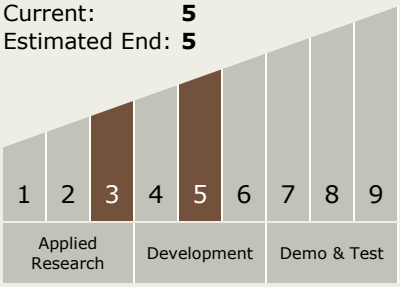
Carlos Torrez

Principal Investigator:

Yongming Zhang

Technology Maturity (TRL)

Start: **3**
Current: **5**
Estimated End: **5**



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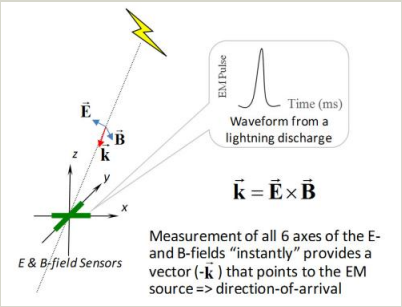
Images



Project Image
3D Geolocation of current pulses in clouds using a 6-axis EB vector sensor Project Image *(https://techport.nasa.gov/image/137271)*

Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.1 Field and Particle Detectors

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System